WHAT IS CLAIMED IS:

1. A special effect device in which picture signals are read out from a frame buffer based on an address signal to impart a desired special effect to the picture signals read out from said frame buffer, said special effect device comprising

address signal generating means for generating a readout address signal for said picture signals stored in said frame buffer so that, by flipping a picture, ruptured with an optional position of a picture, corresponding to said picture signals stored in said frame buffer, as a rupture point, for extending along a curve formed by an arc of a circle of a radius of an optional size, defined on a second virtual plane perpendicular to a first virtual plane to which belongs said picture, and by moving, after said picture corresponding to said rupture point has reached a height of the diameter of the circle on said second virtual plane, said picture corresponding to said rupture point along a plane parallel to said first virtual plane, such a special effect will be obtained in which the picture on said first virtual plane is peeled off sequentially radially along said arc about said optional position as center so as to disappear to outside a display area.

2. The special effect device according to claim 1 wherein, with said radius of the optional size of said circle as radius and the amount of movement of said picture as trans, said address signal generating means generates a readout address signal (R, Θ) on the polar coordinate system of said picture signals in an area in which the picture to be flipped and moved is output, by the equation (1-3):

$$R = f_1(r)$$
$$\Theta = \theta \qquad (1\text{-}3)$$

which satisfies the equation (1-5):

$$f_1(r) = \begin{cases} \text{Max} & (0 \le r < t_r - \text{radius}) \\ t_r - \text{radius} \times \left(\pi + \arcsin\left(\dfrac{t_r - r}{\text{radius}} \right) \right) & (t_r - \text{radius} \le r < t_r) \\ 2 \times t_r - \text{radius} \times \pi - r & (t_r \le r) \end{cases} \qquad (1\text{-}5)$$

where

t_r = trans×(radius + maximum value of the distance from the center to each apex point of the picture)

radius = fixRadius×picture height;

a readout address (R, Θ) on the polar coordinate system of said picture signals in an area for outputting an unflipped picture portion is generated by the equation (1-4):

$$R = f_2(r)$$
$$\Theta = \theta \qquad (1\text{-}4)$$

which satisfies the equation (1-6):

$$f_2(r) = \begin{cases} \text{Max} & (0 \le r < t_r - \text{radius}) \\ t_r - \text{radius} \times \arcsin\left(\dfrac{t_r - r}{\text{radius}} \right) & (t_r - \text{radius} \le r < t_r) \\ r & (t_r \le r) \end{cases} \qquad (1\text{-}6)$$

where

t_r = trans×(radius + maximum value of the distance from the center to each apex point of the picture)

radius = fixRadius×picture height;

the readout address signal (R, Θ) on the polar coordinate system is transformed by the equation (1-9):

$$X0 = R \cos\Theta$$
$$Y0 = R \sin\Theta \qquad (1\text{-}9)$$

to generate the readout address signal (X0, Y0) on the rectangular coordinate system; and wherein

a readout address signal (X, Y) in case said optional position on the rectangular coordinate system of said picture signals is (cx, cy) is generated by the equation (1-10):

$$X = X0 + cx$$
$$Y = Y0 + cy \qquad (1\text{-}10)$$

provided that, in the equations (1-5) and (1-6), Max indicates the generation of the readout address signal for reading out a signal other than the picture signals stored in said frame buffer.

3. An address signal generating device for generating an address signal for reading out picture signals from a frame buffer, comprising

address signal generating means for generating a readout address signal for said picture signals stored in said frame buffer so that, by flipping a picture, ruptured with an optional position of a picture, corresponding to said picture signals stored in said frame buffer, as a rupture point, for extending along a curve formed by an arc of a circle of a radius of an optional size, defined on a second virtual plane perpendicular to a first virtual plane to which belongs said picture, and by moving, after said picture corresponding to said rupture point has reached a height of the diameter of the circle on said second virtual plane, said picture corresponding to said rupture point along a plane parallel to said first virtual plane, such a special effect will be obtained in which the picture on said first virtual plane is peeled off sequentially radially along said arc, about said optional position as center, so as to disappear to outside a display area.

4. An address signal generating method for generating an address signal for reading out picture signals from a frame buffer, comprising

an address signal generating step of generating a readout address signal for said picture signals stored in said frame buffer so that, by flipping a picture, ruptured with an optional position of a picture, corresponding to said picture signals stored in said frame buffer, as a rupture point, for extending along a curve formed by an arc of a circle of a radius of an optional size, defined on a second virtual plane perpendicular to a first virtual plane to which belongs said picture, and by moving, after said picture corresponding to said rupture point has reached a height

of the diameter of the circle on said second virtual plane, said picture corresponding to said rupture point along a plane parallel to said first virtual plane, such a special effect will be obtained in which the picture on said first virtual plane is peeled off sequentially radially along said arc, about said optional position as center, so as to disappear to outside a display area.

5. An address signal generating program for having a computer execute a process of generating an address signal for reading out picture signals from a frame buffer, said process comprising

an address signal generating process of generating a readout address signal for said picture signals stored in said frame buffer so that, by flipping a picture, ruptured with an optional position of a picture corresponding to said picture signals stored in said frame buffer as a rupture point, for extending along a curve formed by an arc of a circle of a radius of an optional size, defined on a second virtual plane perpendicular to a first virtual plane to which belongs said picture, and by moving, after said picture corresponding to said rupture point has reached a height of the diameter of the circle on said second virtual plane, said picture corresponding to said rupture point along a plane parallel to said first virtual plane, such a special effect will be obtained in which the picture on said first virtual plane is peeled off sequentially radially along said arc, about said optional position as center, so as to disappear to outside a display area.

6. A special effect device in which picture signals are read out from a frame

buffer based on an address signal to impart a desired special effect to the picture signals read out from said frame buffer, said special effect device comprising

address signal generating means for generating a readout address signal for said picture signals stored in said frame buffer so that, by flipping a picture, ruptured with an optional position of a picture, corresponding to said picture signals stored in said frame buffer, as a rupture point, for extending along a curve formed by an arc of a circle of a radius of an optional size, defined on a second virtual plane perpendicular to a first virtual plane to which belongs said picture, and by moving, after said picture corresponding to said rupture point has reached a height of the diameter of the circle on said second virtual plane, said picture corresponding to said rupture point as if said picture corresponding to said rupture point is rolled along the other arc, such a special effect will be obtained in which the picture on said first virtual plane is peeled off sequentially radially along said arc, about said optional position as center, so as to disappear to outside a display area.

7. The special effect device according to claim 1 wherein, with said radius of the optional size of said circle as radius and the amount of movement of said picture as trans, said address signal generating means generates a readout address signal (R, Θ) on the polar coordinate system of said picture signals, in an area in which the picture to be flipped and moved is output, by the equation (2-3):

$$R = f_1(r)$$
$$\Theta = \theta \qquad (2\text{-}3)$$

which satisfies the equation (2-5):

$$f_1(r) = \begin{cases} \text{Max} & (0 \le r < t_r - \text{radius}) \\ t_r - \text{radius} \times \left(\pi + \arcsin\left(\dfrac{t_r - r}{\text{radius}} \right) \right) & (t_r - \text{radius} \le r < t_r) \\ t_r - \text{radius} \times \left(\pi - \arcsin\left(\dfrac{t_r - r}{\text{radius}} \right) \right) & (t_r \le r) \end{cases} \qquad (2\text{-}5)$$

where

t_r = trans×(radius + maximum value of the distance from the center to each apex point of the picture)

radius = fixRadius×picture height;

a readout address (R, Θ) on the polar coordinate system of said picture signals in an area for outputting an unflipped picture portion is generated by the equation (2-4):

$$R = f_2(r)$$
$$\Theta = \theta \qquad (2\text{-}4)$$

which satisfies the equation (2-6):

$$f_2(r)=\begin{cases}\text{Max} & (0 \le r < t_r - \text{radius}) \\ t_r - \text{radius} \times \arcsin\left(\dfrac{t_r - r}{\text{radius}}\right) & (t_r - \text{radius} \le r < t_r) \\ r & (t_r \le r)\end{cases}$$

(2-6)

where

t_r = trans×(radius + maximum value of the distance from the center to each apex point of the picture)

radius = fixRadius×picture height;

the readout address signal (R, Θ) on the polar coordinate system is transformed by the equation (2-7):

$$X0 = R \cos\Theta$$
$$Y0 = R \sin\Theta$$

(2-7)

to generate the readout address signal (X0, Y0) on the rectangular coordinate system; and wherein

a readout address signal (X, Y) in case said optional position on the rectangular coordinate system of said picture signals is (cx, cy) is generated by the equation (2-8):

$$X = X0 + cx$$
$$Y = Y0 + cy$$

(2-8)

provided that, in the equations (2-5) and (2-6), Max indicates the generation of the

readout address signal for reading out a signal other than the picture signals stored in said frame buffer.

8. An address signal generating device for generating an address signal from a frame buffer, said special effect device comprising

address signal generating means for generating readout address signals for said picture signals stored in said frame buffer so that, by flipping a picture, ruptured with an optional position of a picture, corresponding to said picture signals stored in said frame buffer. as a rupture point, for extending along a curve formed by an arc of a circle of a radius of an optional size, defined on a second virtual plane perpendicular to a first virtual plane to which belongs said picture, and by moving, after said picture corresponding to said rupture point has reached a height of the diameter of the circle on said second virtual plane, said picture corresponding to said rupture point as if said picture corresponding to said rupture point is rolled along the other arc, such a special effect will be obtained in which the picture on said first virtual plane is peeled off sequentially radially along said arc, about said optional position as center, so as to disappear to outside a display area.

9. An address signal generating method for generating an address signal from a frame buffer, said special effect method comprising

an address signal generating step of generating readout address signals for said picture signals stored in said frame buffer so that, by flipping a picture,

ruptured with an optional position of a picture, corresponding to said picture signals stored in said frame buffer, as a rupture point, for extending along a curve formed by an arc of a circle of a radius of an optional size, defined on a second virtual plane perpendicular to a first virtual plane to which belongs said picture, and by moving, after said picture corresponding to said rupture point has reached a height of the diameter of the circle on said second virtual plane, said picture corresponding to said rupture point as if said picture corresponding to said rupture point is rolled along the other arc, such a special effect will be obtained in which the picture on said first virtual plane is peeled off sequentially radially along said arc, about said optional position as center, so as to disappear to outside a display area.

10. An address signal generating program for having a computer execute a process of generating an address signal for reading out picture signals from a frame buffer, said process comprising

an address signal generating step of generating readout address signals for said picture signals stored in said frame buffer so that, by flipping a picture, ruptured with an optional position of a picture, corresponding to said picture signals stored in said frame buffer, as a rupture point, for extending along a curve formed by an arc of a circle of a radius of an optional size, defined on a second virtual plane perpendicular to a first virtual plane to which belongs said picture, and by moving, after said picture corresponding to said rupture point has reached a height

of the diameter of the circle on said second virtual plane, said picture corresponding to said rupture point as if said picture corresponding to said rupture point is rolled along the other arc, such a special effect will be obtained in which the picture on said first virtual plane is peeled off sequentially radially along said arc, about said optional position as center, so as to disappear to outside a display area.

11. A special effect device in which picture signals are read out from a frame buffer based on an address signal to impart a desired special effect to the picture signals read out from said frame buffer, the special effect device comprising

address signal generating means for generating a readout address signal for said picture signals stored in said frame buffer so that a figure corresponding to a picture stored in said frame buffer folded n times from an end of said picture with a straight line(s) defined at an optional position of the picture stored in said frame buffer for dividing said picture into n portions, as a folding boundary line(s), will be produced, where n is a natural number.

12. The special effect device according to claim 11 wherein, with the width W of said picture, the number of times n of folding, the amount of movement trans of said picture and a position T of said picture by one folding, said address signal generating means generates, in case the center of said picture signals is the point of origin, a readout address signal (X1, Y1) in an area for outputting the folded picture portion is generated by the equation (3-3):

$$X1 = f_1(x1)$$
$$Y1 = y1$$

(3-3);

a readout address signal (X1, Y1) in an area for outputting the unfolded picture portion is generated by the equation (3-4):

$$X1 = f_2(x1)$$
$$Y1 = y1$$

(3-4);

a readout address signal (X0, Y0) in case the rectangular coordinate axis is rotated by ø is generated by the equation (3-9):

$$X0 = X1\cos\varphi - Y1\sin\varphi$$
$$Y0 = X1\sin\varphi + Y1\cos\varphi$$

(3-9);

and wherein

a readout address signal (X, Y) in case the position of the point of origin in the rectangular coordinate system of the picture signals is (cx, cy) is generated by the equation (3-10);

$$X = X0 + cx$$
$$Y = Y0 + cy$$

(3-10);

on the condition that, with $0.0 \leq T < 0.5$, the equations (3-3) and (3-4) respectively satisfy the equations (3-5) and (3-6):

1) $0.0 \leq T < 0.5$

$$f_1(x1)=\begin{cases}\text{Max} & (x1 < x'-W\cos\theta)\\ x'-2W-\dfrac{x1-x'}{\cos\theta} & (x'-W\cos\theta \le x1 < x')\\ \text{Max} & (x'\le x1)\end{cases}$$

(3-5)

$$f_2(x1)=\begin{cases}\text{Max} & (x1 < x'-W\cos\theta)\\ x'+\dfrac{x1-x'}{\cos\theta} & (x'-W\cos\theta \le x1 < x')\\ x1 & (x'\le x1)\end{cases}$$

(3-6)

where

$$W=\frac{\text{max}imum\quad picture\quad width\quad after\quad rotation}{IDivide}$$

x' = W × (number of times of folding − 1)

$\theta = T \times \pi$

T = fraction part of trans×IDivide;

with $0.5 \le T < 1.0$, the equations (3-3) and (3-4) respectively satisfy the equations (3-7) and (3-8):

2) $0.5 \le T < 1.0$

$$f_1(x1)=\begin{cases}\text{Max} & (x1 < x')\\ x'+\dfrac{x1-x'}{\cos\theta} & (x'\le x1 < x'-W\cos\theta)\\ \text{Max} & (x'-W\cos\theta \le x1)\end{cases}$$

(3-7)

$$f_2(x1) = \begin{cases} \text{Max} & (x1 < x') \\ x1 & (x' \leq x1) \end{cases}$$

(3-8)

where

$$W = \frac{\text{max}imum \quad picture \quad width \quad after \quad rotaton}{\text{IDivide}}$$

x' = W × (number of times of folding − 1)

$\theta = T \times \pi$

T = fraction part of trans×IDivide;

provided that, in the equations (3-5), (3-6), (3-7) and (3-8), Max indicates the generation of the readout address signal for reading out a signal other than the picture signals stored in said frame buffer.

13. An address signal generating device for generating an address signal for reading out picture signals from a frame buffer, comprising

address signal generating means for generating a readout address signal for said picture signals stored in said frame buffer so that a figure corresponding to a picture stored in said frame buffer folded n times from an end of said picture, with a straight line(s) defined at an optional position of the picture stored in said frame buffer for dividing said picture into n portions, as a folding boundary line(s), will be produced, where n is a natural number.

14. An address signal generating method for generating an address signal for reading out picture signals from a frame buffer, comprising

an address signal generating step of generating a readout address signal for said picture signals stored in said frame buffer so that a figure corresponding to a picture stored in said frame buffer folded n times from an end of said picture, with a straight line(s) defined at an optional position of the picture stored in said frame buffer for dividing said picture into n portions, as a folding boundary line(s), will be produced, where n is a natural number.

15. An address signal generating program for having a computer execute a process of generating an address signal for reading out picture signals from a frame buffer, said process comprising

an address signal generating step of generating readout address signals for said picture signals stored in said frame buffer so that a figure corresponding to a picture stored in said frame buffer folded n times from an end of said picture, with a straight line(s) defined at an optional position of the picture stored in said frame buffer for dividing said picture into n portions, as a folding boundary line(s), will be produced, where n is a natural number.